ALBERTA CHAMBER OF RESOURCES

OUTLOOK ON OIL SANDS #2 CANADA'S UNIQUE OPPORTUNITY

Submitted by:
The Alberta Chamber of Resources
Oil Sands Task Force

March, 1988

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March 4, 1988

Mr. Douglas Patriquin
Secretary General
Energy Options
P.O. Box C.P. 4510
OTTAWA, Ontario
K1S 5B5

Dear Mr. Patriquin:

RE: Second Position Paper on Oil Sands Development for the Energy Options

On behalf of the Alberta Chamber of Resources Oil Sands Task Force, I am pleased to present to you the second position paper on the benefits of oil sand development. This is the continuation of the Task Force's initial submission to the Energy Options last September. The paper points out the unique characteristics of oil sands resources and the socio-economic benefits associated with the oil sands development projects.

The ACR Oil Sands Task Force published a series of papers on oil sands including the recent work on the Regional Upgrader Concept and other processing options. We would be pleased to meet with you and present a summary of our findings.

We trust that the Energy Options recognize "Canada's Unique Opportunity" in developing oil sands and give the necessary consideration to this energy resource in its recommendations.

Yours truly,

Erdal YILDIRIM, D.Eng.Sc.
Chairman
The ACR Oil Sands Task Force

EY/lw
Attachment

cc: Dr. D.W. Devenny - Gulf Canada Resources
Mr. D.V. Currie - ACR Managing Director

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To
ENERGY OPTIONS
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1. INTRODUCTION

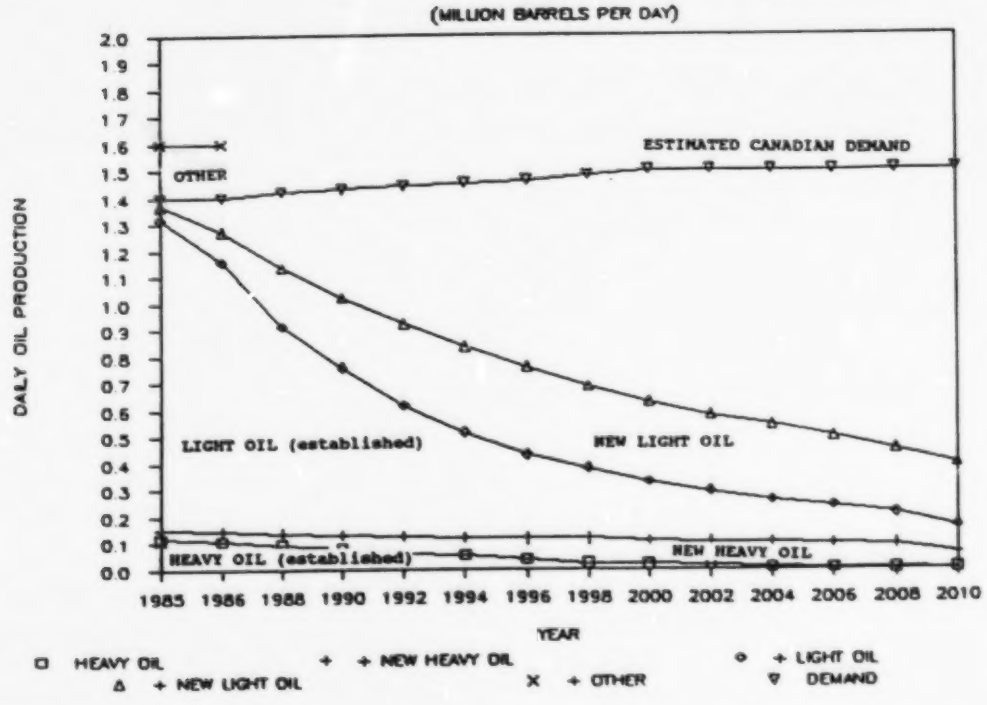
The Alberta Chamber of Resources is committed to fostering orderly development of Canada's energy resources.

Oil is one important source of energy for Canada. It is of prime importance for transportation. Demand forecasts for oil indicate a steady domestic need of about 1 1/2 million barrels of oil per day for the foreseeable future.

Today Canada is self sufficient in domestic oil supply. However production capability from Canada's conventional domestic sources of oil is declining. Figure 1 illustrates the continuing demand and the decline in production capability from conventional sources. New discoveries of conventional oil are not expected to match consumption. As a result, in a very short while, Canada will not be able to match domestic oil demand from conventional domestic sources.

Figure 1

CANADIAN OIL PRODUCTION/DEMAND



Fortunately, Canada is uniquely blessed with abundant reserves of unconventional oil. Significant reserves have been found offshore in Eastern Canada and in the Arctic. In addition, vast reserves of bitumen exist in the Athabasca oil sands.

Unfortunately, conditions needed to develop Canada's reserves of unconventional oil are poorly understood. They are quite different from those associated with conventional oil. Advice from other learned sources has been lacking in background information about the unique needs and advantages of developing unconventional domestic sources.

The Chamber believes that Alberta's oil sands play an important role in Canada's energy future. They are the only resource with sufficient developable reserves to meet Canada's long term needs. Orderly development is in Canada's best interests.

The purpose of this paper is to:

- review options for meeting Canada's oil supply needs
- identify benefits associated with domestic production
- identify conditions that affect development of Canada's unconventional oil resources
- show the true potential for the Athabasca oil sands
- suggest an action plan that is in Canada's best interests.

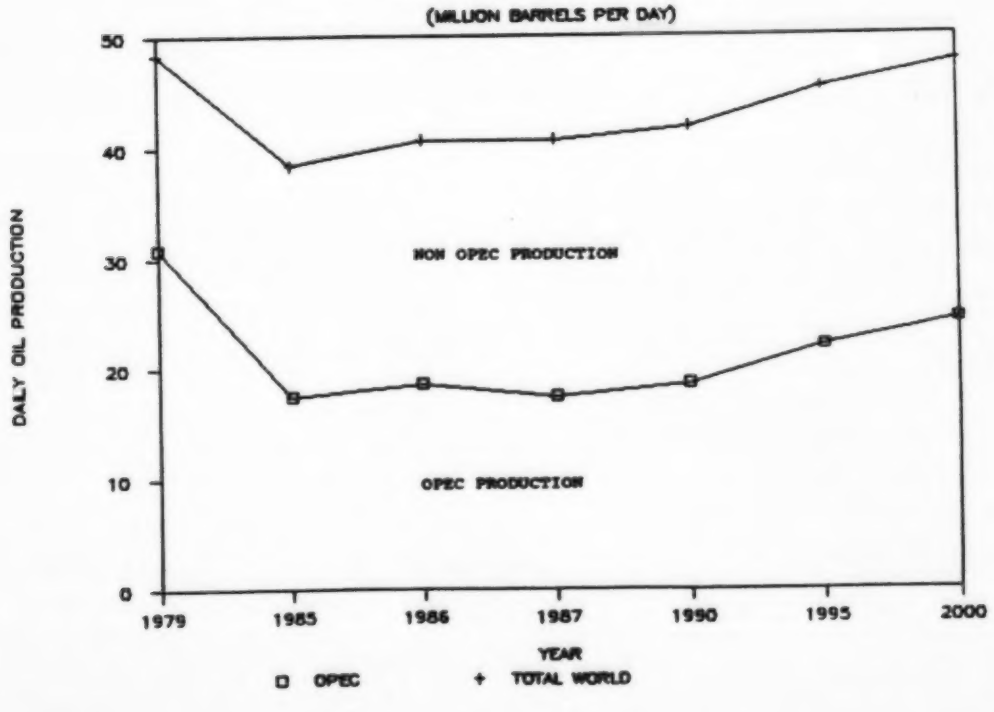
The outlook of the paper is long term - into the next century.

2. WORLD OIL SUPPLY/DEMAND OUTLOOK

The demand for oil in the non-communist world to the year 2000 is shown by Figure 2. Demand is expected to increase gradually from 40 million barrels of oil per day today to 49 million barrels of oil per day by the year 2000.

Figure 2

WORLD OIL PRODUCTION



Today there are abundant sources of supply. OPEC countries have the richest oil reserves and production capability. Today they are operating at reduced capacity and produce just over 40% of the world's supply. Over time, however, non-OPEC sources of supply will decline and OPEC's share of the market will increase.

The price of oil today is unstable due to surplus production capacity and OPEC's inability to control prices. Today the price fluctuates about $18US ($24Can.) per barrel. As the OPEC share of the market increases prices are expected to rise. Price forecasts are unreliable. In 1987 dollars they will probably be $33 Cdn. in the mid to late 1990's.

3. CANADIAN OIL SUPPLY/DEMAND OUTLOOK

In 1987 Canada consumed 1.5 million barrels of oil per day. Demand is expected to rise slightly over the study period.

Canada produces 1.6 million barrels of oil per day today - more than it consumes. 15% of that production is unconventional production from the oil sands. Canada is linked to the world oil market because:

- most of Canada's production is in Western Canada
- about 60% of domestic production is consumed in Western Canada and Ontario
- the remaining 40% of domestic production is exported to the United States
- much of the oil exported is heavy oil and bitumen that Canadian refineries cannot process
- Quebec and Eastern Canada import their oil needs

The price of oil throughout Canada is tied to the world price. Factors that affect the global market are felt instantly throughout the Canadian system.

An extensive infrastructure and work force is involved in finding, developing, and producing domestic oil in Canada. This oil related infrastructure forms a significant part of the Canadian economy. It warrants careful consideration when changes to domestic oil supply in Canada are contemplated.

With its northern climate. Canada has a special interest in long term security of supply. Figure 1 indicates that production capability from conventional sources is declining. It is logical that steps should be taken to sustain domestic production capability. It is also logical that the development of new resources should be continuous and economically justifiable.

4. OPTIONS FOR MEETING CANADA'S LONG TERM OIL SUPPLY NEEDS

Options available to make up for the decline in domestic production capability are noted in Table 1:

Table 1: Potential Sources of Supply to Meet Canada's Oil Needs

1. Imported Oil
2. Conventional Oil
   - new discoveries
   - enhanced recovery
3. Heavy Oil
4. Frontier Sources
   - East Coast (Hibernia)
   - Arctic (Beaufort)
5. Oil Sands

Projected production from new discoveries of conventional oil and from enhanced recovery are shown on Figure 1. They are not adequate to offset the decline.

Reserves of heavy oil are limited and are not significant in the long term picture.

Proven reserves off the East Coast are sufficient to meet Canada's total demand for a little more than one year.

Proven reserves in the Beaufort are sufficient to meet Canada's total demand for two years.

The oil sand reserves are vast and are capable of supplying Canada's needs for many decades.

Canada's new sources of potential domestic production are not conventional. Guidelines that apply to conventional oil can be misleading if applied to them. Requirements for developing Canada's unconventional oil resources need to be better understood and are discussed in the following sections.

5. CHARACTERISTICS OF CANADA'S UNCONVENTIONAL RESOURCES

Table 2 illustrates the differences between developing oil supplies from conventional vs. unconventional resources.

Table 2: Difference in Developing Conventional vs. Unconventional Oil Resources

ASPECT	CONVENTIONAL OIL	UNCONVENTIONAL OIL
Government role	Limited	Significant
Fiscal terms	Established, understood.	Not known. Terms must be negotiated for each project.
Location	Easy access	Remote
Infrastructure	Usually exists	Must be provided
Time to bring into production	Short	Long - several years
Time to payout	Short	Long
Staged development	Normal	Large blocks needed to justify infrastructure.
Size	Initially small May grow later	Large to support infrastructure.
Cost	Modest	Large
Ownership	Simple can be owned by one company.	Complex, requires multi owners to share costs.
Technology	Available	May need development
Technology risk	Normal	May be high
Work force	Trained staff exists.	Probably have to train new work force.
Lead time	Short	Long
Planning outlook	Short	Very long outlook
Risk	Understood, small.	Potentially large.

One eighth of Canada's domestic oil production is synthetic oil derived from mineable oil sand deposits. Different characteristics of this source of production are highlighted by Table 3.

Table 3: Special Characteristics of Synthetic Oil Production

- large, long term projects
- long lead time needed
- government plays an important role
- development and operations are labour intensive
- large associated social benefits
- technology is well proven
- production is steady for long periods of time
- cost:
  - large construction cost
  - relatively high operating costs
  - supply cost - 20¢ per litre
- opportunity
  - large source of supply for Canada
  - good potential for significant cost reduction.

Major differences that Tables 2 and 3 indicate for developing unconventional oil resources include:

- government plays an important role
- fiscal terms are needed but have not been defined
- large project size
- development must also provide infrastructure
- long lead time to bring on stream
- large capital cost
- risk

Today the world oil market is dominated by surplus production capability and by uneven and unstable prices. Short term aspects including daily price shocks, dominate planning. This makes development of unconventional resources difficult.

Considering the rate at which conventional reserves are depleting, and the long lead time to develop unconventional resources, development efforts should be underway now. 15 years have passed since construction started on a new oil sand plant in the Athabasca area. No frontier projects have been announced.

A long term energy policy that favours orderly development of Canada's energy option is badly needed.

6. THE COST OF DEVELOPING DOMESTIC OIL SUPPLIES IN CANADA

The approximate cost of developing various sources of Canadian oil is summarized in Table 4. It covers the main cost components; finding, developing, producing and transporting to market. The costs quoted are supply costs per barrel expressed in 1987 Canadian dollars. A discount factor of 10% was used to compute the supply cost.

Table 5 addresses the same aspects in terms of direct employment.

Table 4: Cost of Various Sources for Canadian Oil

ASPECT	OIL SANDS	FRONTIER OIL	CONVENTIONAL
Find	$0	$0 - $30	$3.64 - $21.60
Develop	$15	$12	
Produce	$13	$6	$4 - $7
Transport	$ 2	$3 - $8	$2
Total (minimum)	$25	$21	$13
Total (maximum)	$33	$40	$25

Table 5: Labour Associated with Different Sources of Canadian Oil

Direct Man Hours Per 1,000 Barrels of Production

ASPECT	OIL SANDS	FRONTIER OIL	CONVENTIONAL
Find	0	low to high	low to high
Develop	55 - 85	60	low
Produce	160	55	low

The cost of finding oil sand reserves is very low. The cost of finding oil in frontier areas is very high. The cost of finding and developing conventional oil is increasing each year. In the last decade the average cost of finding conventional oil has doubled from $4 to $8 per barrel. The increase would be even larger if the quantity of oil found matched consumption.

It is worth noting that another way of stating the cost of developing oil sands at a supply cost of $25 to $33 per barrel is 16¢ to 20¢ per litre.

The tables indicate that oil production from conventional sources can be economically attractive. In addition, exploration and development of this resource uses existing infrastructure and an existing trained work force. Exploration and development of conventional oil should be encouraged as long as costs (including finding costs) are competitive.

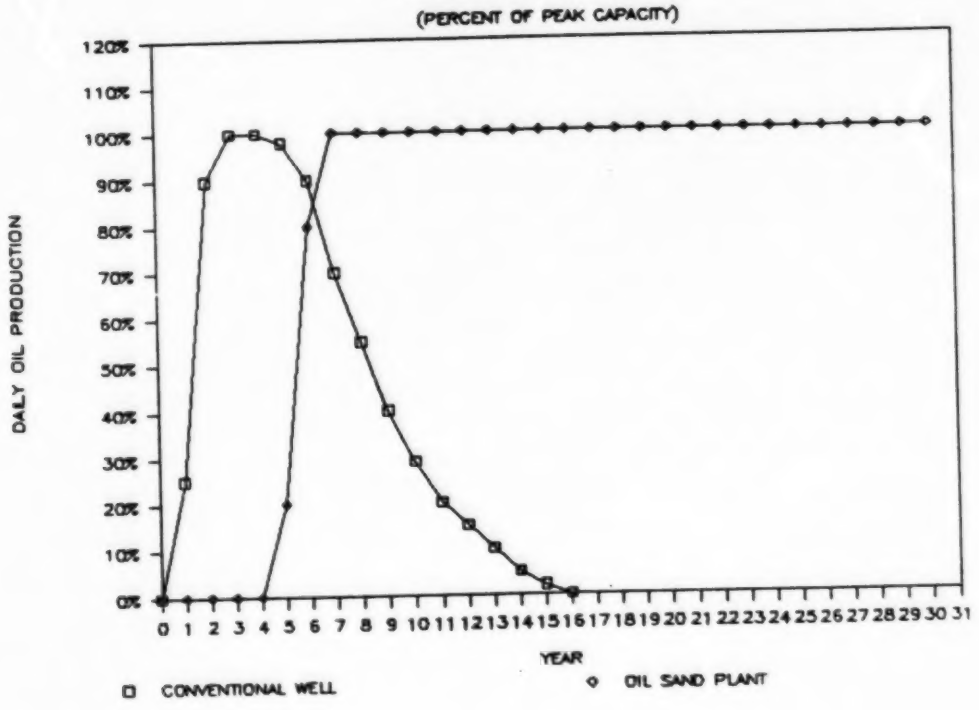
Some existing discoveries in the Frontier also look promising. Their development should be encouraged. Further Frontier development will depend on the cost of finding additional reserves.

The tables suggest that the oil sands look the least attractive. However, potential exists to reduce the supply costs below what is shown. In addition, they contain the only developable reserves that are large enough to meet Canada's needs on a sustained basis. Operations are very manpower intensive.

The production profile for the life of an oil sand project is quite different from that of an oil well. Figure 3 illustrates the difference. The production profile for the oil sand project is very steady for a very long period of time. In contrast the production from the conventional well illustrated by Figure 3 peaks after a few years and then declines. If production from the conventional well is compared with the production from an oil sand plant (as a source of supply) the cost of finding sustaining production must be included in the analysis for the conventional well.

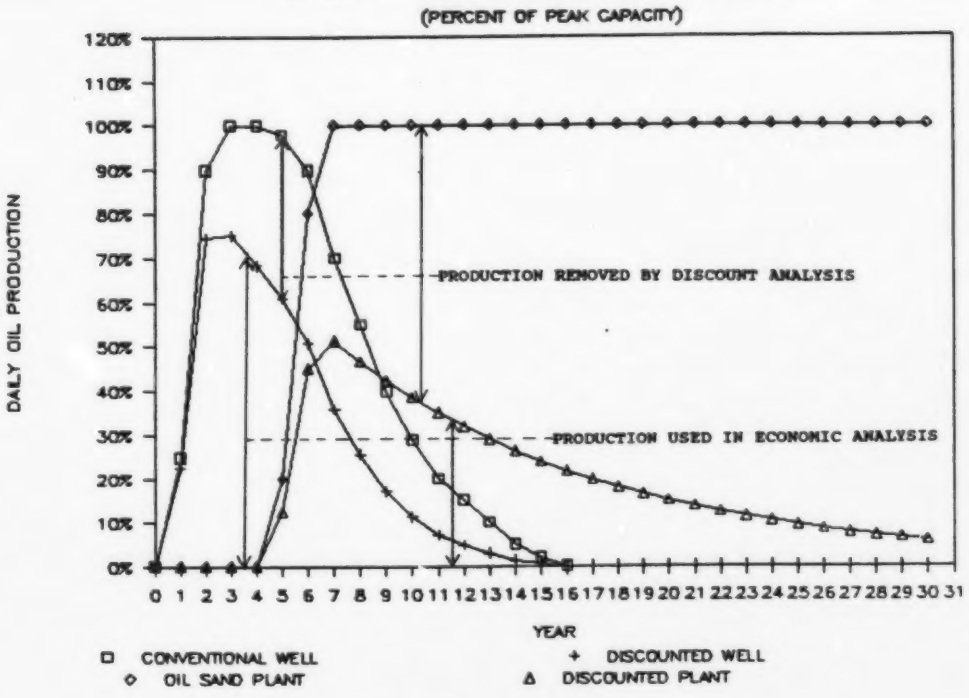
Figure 3

PRODUCTION PROFILE



Discounting commonly employed in economic analysis favours short term projects. Figure 4 shows how discounting as used in a supply side cost analysis eliminates part of the production. In the case of the long term oil sand project discounting at a rate of 10% ignores almost 80% of the production. For the short lived project used in the illustration, discounting has little effect and most of the production is included in the analysis.

Figure 4
EFFECT OF DISCOUNTING ON PRODUCTION



This aspect suggests that 10% discounting that is appropriate for a conventional short term project may penalize projects that offer long term production. Perhaps a lower discount factor would be more appropriate for oil sand projects.

The adverse effect that discounting introduces to business decisions is being recognized in other parts of the Canadian economy.

7. SOCIAL BENEFITS ASSOCIATED WITH DEVELOPING AN OIL SAND PLANT

The Alberta Chamber of Resources has recently completed a study of social benefits associated with the development of an oil sand project. Social benefits are know to be high because the projects are labour intensive. In addition, because the projects utilize a high proportion of manufactured goods, the ratio of spin-off jobs is high.

Four levels of social benefits were considered in the study. They are summarized in Table 6.

Table 6: Levels of Social Benefits

LEVEL	DESCRIPTION
Level 1	Direct benefits
Level 2	Direct + Indirect Benefits
Level 3	Direct, Indirect and Induced Benefits
Level 4	Benefits associated with unemployment offsets

Table 7 illustrates how social benefits can reduce the apparent net cost of domestic oil production if comparisons are to be made with imports. In the example social benefits were computed for each level of social benefit. The net supply cost was obtained by subtracting the social benefit from the full supply cost. Full deduction of all levels of social benefit is not advocated for each project. The purpose of the illustrations is to show that social benefits have value. Each project will have to be assessed on its own merits and circumstances.

Table 7: Derivation of Net Social Cost to Illustrate How Social Benefits Improve a Project

LEVEL	SOCIAL BENEFIT	NET SOCIAL COST
	SUPPLY COST	$33.33
Level 1	$6.09	$27.24
Level 2	$3.54	$23.70
Level 3	$3.54	$20.16
Level 4	$3.71	$16.45
Cost of Imported Oil		$25.00

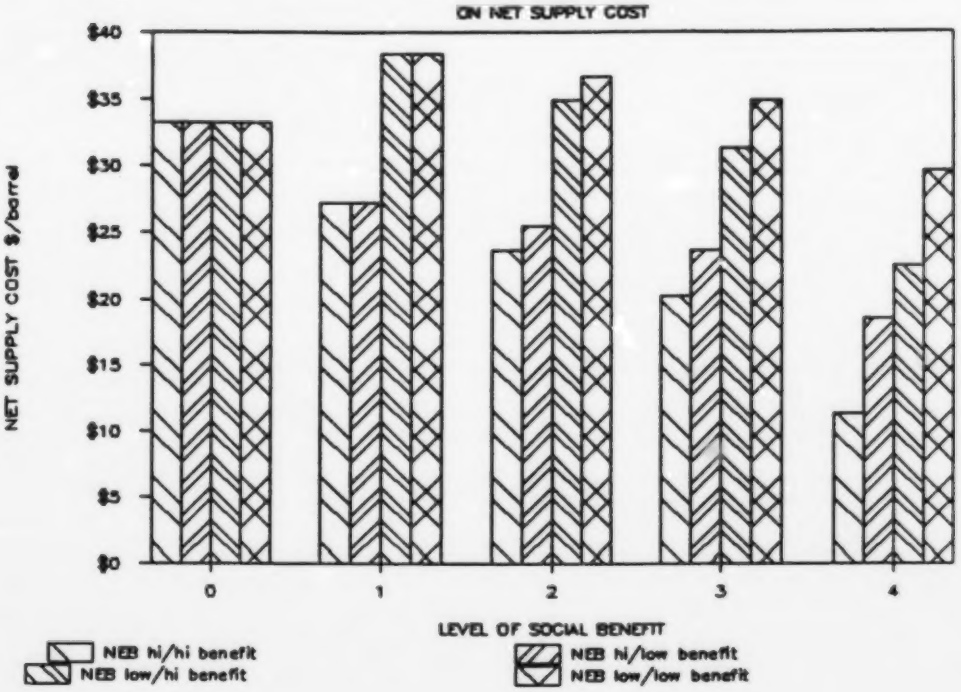
Computed social benefits are a function of job spin-off ratios and product price forecasts. Table 8 summarizes the low and high job spin-off ratios assumed in the study. Product price forecasts were NEB high and NEB low forecasts.

Table 8: Job Spin-off Ratios

LEVEL	Total Number of Jobs LOW	HIGH
Level 1	1	1
Level 2	2	3
Level 3	3	5

Figure 5 shows the effect of different prices and spin-off ratios on net supply cost for different levels of social benefit. If we consider that the benefit ratio for oil sand projects is relatively high we can conclude that social benefits make development attractive under most circumstances.

Figure 5
EFFECT OF SOCIAL BENEFIT
ON NET SUPPLY COST



8. SHOULD SOCIAL BENEFITS BE CONSIDERED

The applicability of social benefits can be challenged. Where full employment exists it can be argued that everyone will be gainfully employed so the benefits should not be claimed to be specific to the project. In the case of Alberta, however, social benefits should be claimed because:

- revenue (for producers and governments) and employment opportunities are related to the volume of oil production.

- oil production from conventional sources in Alberta is declining. As the volume of production declines there will be a related (proportional) drop in revenue and employment opportunities. Without replacement, opportunities for full employment will not exist in Alberta. Indeed, unemployment is likely to become a serious problem.

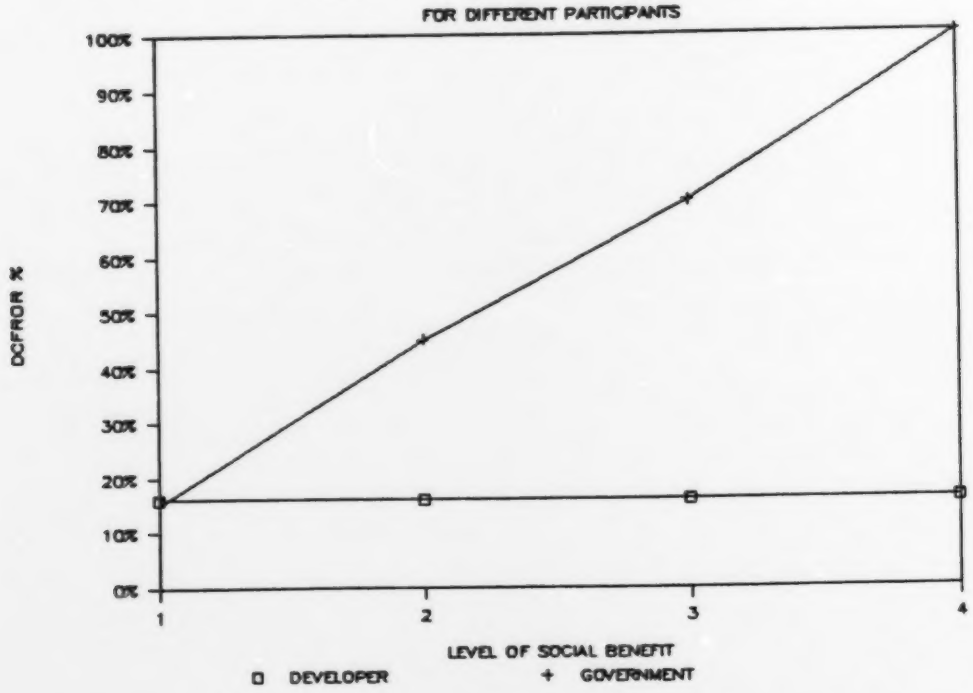
- the value of lost revenue and the cost of unemployment resulting from the decline in oil production from conventional sources should be recognized if domestic oil production is to be replaced by imported oil.

- the development of new oil production capability from domestic sources can offset effects of the decline from conventional sources. It provides revenue and employment opportunities that would not be available if imported oil was substituted.

9. WHO BENEFITS

Figure 6 shows the apparent benefit for the developer and for government involved in the development of an oil sand project. The figure shows trends - not exact data.

Figure 6
RETURN VS LEVEL OF SOCIAL BENEFIT
FOR DIFFERENT PARTICIPANTS



The developer deals only with direct cash flow and does not share in social benefits. Business decisions are based on the developer's point of view and do not normally consider social benefits.

When social benefits are taken into account, governments are the main benefactors. If unemployment benefits are claimed the return to government exceeds 100%.

The fact that social benefits accrue to Canada but not to the developer who makes the business decisions indicates a problem. When a project offers significant social benefit, as is the case for oil sands development, it is in Canada's best interest that development proceed. Means are needed to encourage developers to proceed with projects that offer high social benefits.

10. INTANGIBLE BENEFITS

In addition to obvious economic benefits associated with developing an oil sands plant there are intangible benefits. These are indicated in Table 9 and Table 10.

Table 9: Some Intangible Benefits Associated With Developing Oil Sand Plants

Steady development will offset the adverse effects associated with the decline in conventional oil production in Alberta and elsewhere in Canada.
Development will contribute to energy security.
Orderly development will create steady employment and retain expertise needed for oil sands developments.
Significant social benefits accrue to Canada.
The projects will contribute directly to Canada's balance of payments.
Each new facility is a project that can be expanded quickly in the future.

Table 10: Intangible Costs

Community infrastructure and facilities
Transportation systems
Government monitoring costs
Environmental impact costs
Social impact costs

It is believed that the social benefits are much greater than the social costs.

11. ACTION THAT COULD ASSIST DEVELOPMENT

Government is a major participant in oil sands development. Some of the impediments to development are due to government action or inaction. Some positive steps that governments could take to aid development are listed in Table 11.

Table 11: Government Action That Could Assist Development

1. Create awareness	° need for development not apparent
i) Better focus to NEB and EMR reports.	° look at the whole picture ° identify conditions unique to Canada ° identify long term options ° identify need for orderly development
2. Government role	° recognize that government has a significant role ° Government should proceed with its part of the task
3. Establish long term goals for orderly development of Canada's competitive resources.	° historically lacking ° needed
4. Recognize the value of social benefit when assessing if a project is competitive.	° establish procedures to evaluate benefits
5. Establish procedures to support developments that offer significant social benefit.	° developer does not share in social benefits ° support of worthy projects is warranted ° procedures to reward developer are needed
6. Establish clear long term fiscal and royalty regimes.	° historically lacking ° needed so industry can plan
7. Reduce controllable risk.	° eliminate government overlap ° clarify development guidelines

A government commitment to long term orderly development of Canada's economic energy resources should provide stability for our future. This would offset the adverse impact of daily price shocks that the present industry is tied to and allow orderly planning and development to take place. In the long term Canada will benefit from this approach.

12. A HISTORICAL PERSPECTIVE

Last year Canada celebrated 100 years of engineering. Innovative engineering projects have been an important part of Canada's history. They have been partially responsible for establishing the size of Canada and for establishing infrastructure that results in the standard of living enjoyed in Canada today.

Government played a significant role in launching the early projects. Support was directed toward long term goals for the benefit of Canada.

Engineering design and construction in the early projects deviated from the habits and traditions of others. A common characteristic was that imaginative solutions were found that made the best use of Canada's resources.

The development of Canada's long term energy supplies could benefit from continued application of our earlier traditions.

13. CONCLUSIONS AND RECOMMENDATIONS

1. This paper addresses the supply of Canada's long term oil needs from domestic sources.

2. Today Canada produces slightly more oil than it consumes. A significant infrastructure and work force is dedicated to domestic oil production. The production capability of Canada's domestic oil supply is declining rapidly. New sources of supply will be needed to offset the decline.

3. Oil production in Canada is closely linked to the international market. Factors that affect the global market are instantly felt throughout the Canadian system.

4. Canada has a unique resource base that can be developed to offset any decline in domestic production capability. Potential sources of domestic supply:

   Conventional Oil
   - new discoveries
   - enhanced recovery

   Heavy Oil

   Frontier Resources
   - East Coast (Hibernia)
   - Arctic (Beaufort)

   Oil Sands

5. Production from conventional oil sources will not be able to keep up with the decline. Heavy oil is not a significant factor in the long term. Proven Frontier reserves will only be able to meet Canada's total supply needs for three years. Oil sands contain the only reserves capable of meeting Canada's long term needs.

6. Canada's new oil resources are not conventional. Requirements for developing them are quite different than they are for conventional oil. Among the differences:

   - there is a significant role for Government
   - projects tend to be quite large
   - development is capital intensive

- long lead times are needed to develop these resources
- long range planning is needed

7. Short term shocks associated with the international oil market made it difficult for industry to plan and to finance the development of Canada's unconventional oil resources.

8. A long term energy policy is needed that favours orderly development of Canada's competitive assets. Such a policy is needed to offset instabilities of the international market that interfere with long term planning and development.

9. Canada will need production from all domestic sources if it is to maintain long term self sufficiency in oil supply. Conventional oil production makes good use of existing infrastructure and a trained work force. It should be encouraged as long as it is competitive. Some of the Frontier discoveries look attractive. Their development should be encouraged as long as production (including finding costs) is competitive. Oil sands are also competitive for meeting Canada's long term needs. They should be developed on a continuing basis.

10. Because of the long lead time needed to develop unconventional sources of supply, development should be underway now to offset the decline in conventional production.

11. Canadian development has a history of imaginative engineering projects that make best use of the resources available.

12. Development decisions should be based on an economic assessment. The economic assessment should appraise all costs including social benefits. Social benefits should also be considered when the cost of developing domestic supplies is compared with the cost of importing oil.

13. Significant social benefits are associated with oil sands development.

14. Developers do not share in social benefits. When social benefits make a project more attractive, means should be found to make the development more attractive to the developer.

15. Orderly sustained development of the oil sands is desirable to allow orderly transfer of infrastructure and workers from conventional oil production to this source. Orderly sustained development will maximize the social benefit to Canada.

16. Canada should proceed immediately with orderly development of its unique resources.

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